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How Long Will it Take Corn to Emerge?

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It's an understatement to say that March in Iowa was much warmer than normal (Figure 1). Although only a few record high daily temperatures were set, the average monthly temperature set a new record by a substantial margin. The consistent warm weather encouraged a few to plant corn as early as mid-March. Soil temperatures state-wide reached 50 F by March 15. Although not a first historically, it was a full month before soils normally warm to 50 F at the 4 inch depth.

The warm soil temperatures encouraged rapid germination and seedling emergence – by the third week of March. With April came a "hard" freeze (low air temperatures below 28 F) and a cooling of the soils to levels that did not sustain rapid seedling development.

Planting corn into cool soils increases variability not only of emergence, but also of plant to plant sizes and development stages. In addition the freeze likely destroyed some or all of the leaves of emerged plants; but, since seedlings' growing points were still well below ground, plants likely recovered and stands (plant populations) were unaffected. Frosted plants typically recover at different rates resulting in variable growth and development. Variability in plant size – whether from cool soil temperatures or from frost - will affect plant-to-plant competition and reduce yield.

Corn typically requires 90 to 120 Growing Degree Days (GDD) from planting to emergence. Of course this GDD range assumes adequate soil moisture and varies with planting depth, tillage system and residue cover. As a rule of thumb, if 120 GDD have accumulated since planting and seedlings haven't emerged, check the condition of planted seed.

You may track GDD accumulations for the Corn Belt location of your choice by clicking on 'single site graphs' on the Mesonet website. Your specific planting date information is easily selected from the drop-down windows. Choose the weather station near your farm from the list or select by clicking the "dot on the map" near your farm. Track the GDD accumulation at your location (a blue line is produced) and compare it to the normal GDD accumulation for your location (a red line is displayed). It is helpful to also make a graph of last year to give you an idea of average GDD accumulation to help visualize the similarities and differences between this year and the past year.

You need to remember that GDD's are calculated based on air temperatures using the 86/50 method typical for corn production. Using that method, if air temperatures remain at or below 50 F, emergence will not occur.

Since GDD calculations are based on air temperatures, four-inch soil temperatures may actually better predict seedling emergence than accumulated GDD's. The Mesonet provides a daily update of both the Iowa soil temperature and GDD. Laboratory studies have shown that for most corn

hybrids grown in the Midwest, seedling emergence is about three weeks if the soil temperature is 51 F and is about one week if the daily soil temperature holds near 70 F (Figure 2).

After emergence, evaluate the surviving plant stand carefully whether or not you expect good emergence and seedling survival. Both poor stands and plant-to- plant variability lower yield potential. Depending on the potential date of replant though, keeping the surviving stand – albeit of variable plant heights and development – may still be the best option. (See: Replanting Information)

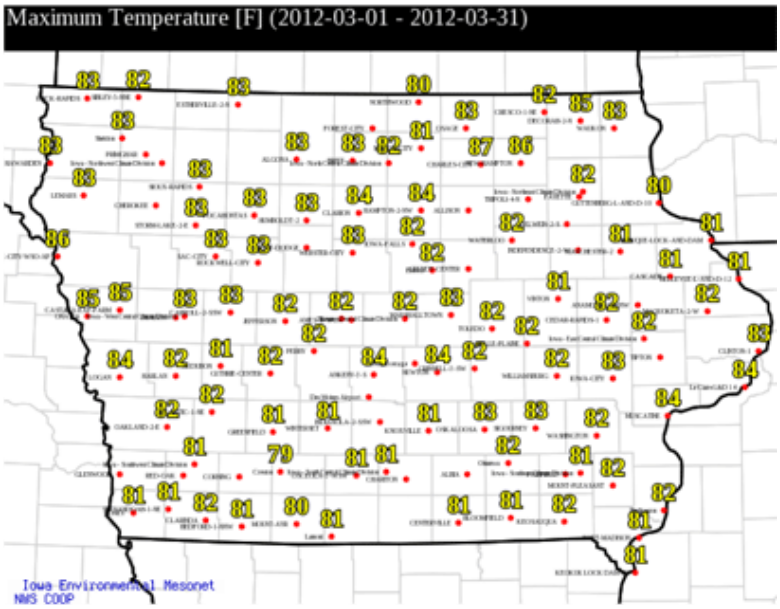

Figure 1. Most Iowa locations enjoyed at least one March day of temperatures reaching 80 F. At Ames the average daily high was 64 F, eclipsing the old record of 58 F set in 1968. *Climodat information from mesonet.agron.iastate.edu.*

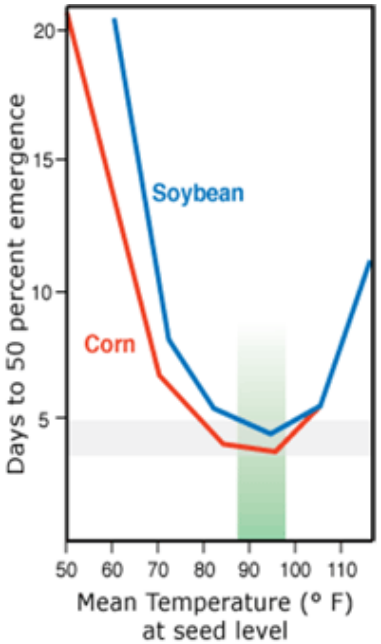

Figure 2. If the soil temperature is averaging 50 to 55 F (10-12.8 C) at the time of planting, corn may take three weeks to emerge. Temperatures averaging 60 F (15.6 C), may have emergence in 10 days to 12 days. Soybean emergence usually requires that soils be about 10 degrees warmer than for corn although soybean does begin to respond at 50 F.

Data from Elwynn Taylor, Iowa State University.

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